

Table of Contents — *Modern Power System Analysis*

For a study or thesis related to SPV, the most relevant topics from **I. J. Nagrath and D. P. Kothari, Modern Power System Analysis** are:

1. Introduction to Power Systems

- Structure of electric power systems
- Generation, transmission and distribution
- Conventional and renewable energy sources
- Distributed generation
- Energy storage

2. Representation of Power System Components

- Generators
- Transformers
- Transmission lines
- Loads
- Per-unit system

3. Transmission Line Parameters and Performance

- Resistance, inductance and capacitance
- Voltage regulation
- Power transfer
- Active and reactive power
- Transmission losses

4. Load Flow Analysis

- Power flow equations
- PQ, PV and Slack buses
- Gauss-Seidel method
- Newton-Raphson method
- Fast decoupled load flow
- Voltage profile analysis

5. Power System Control

- Voltage control
- Reactive power control

- Frequency control
- Generator control

6. Power System Fault Analysis

- Three-phase faults
- Symmetrical components
- Unsymmetrical faults
- Short-circuit analysis

7. Power System Stability

- Steady-state stability
- Transient stability
- Power-angle relationship
- Voltage stability

8. Reactive Power Compensation

- Reactive power management
- Voltage support
- FACTS devices
- Improvement of system performance

9. Distributed Generation and Renewable Energy Integration

- Renewable energy sources
- Distributed generation
- Grid-connected generation
- Impact on power-system operation

10. Application to Solar Photovoltaic (SPV) Systems

- PV generation
- Grid-connected PV systems
- PV inverter
- Active and reactive power injection
- MPPT
- Voltage regulation
- Impact of PV penetration on the network